



Day/Night Identity Dominance

ONR Program Code 30

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At a Glance

What is it?

■ Day/night identity dominance is the ability to do facial recognition at longer tactical distances than currently possible to include night time facial recognition. The product includes the development of image enhancement algorithms required to enable pattern matching against a data base to be possible at greater distances. A variety of unique identity clues are exploited from IR collected imagery to increase the accuracy of night time subject identification.

How does it work?

■ Images captured from long distances are enhanced by correcting for the air turbulence between the subject and the imager. By removing the air turbulence, only the sharpest resolution elements of the image are presented to the classifier, resulting in better template matching at longer distances.

What will it accomplish?

■ Day/night identity dominance will enable the identification of high value targets at standoff distances and at night, removing their ability to blend into the terrain and remain anonymous. Identify dominance allows the warfighter to take proactive actions against entities of interest.

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The Office of Naval Research (ONR) has invested in facial recognition at the Discovery and Invention (D&I) level for many years. The success of the previous efforts enabled a level of confidence that the techniques developed could be applied to facial recognition at

increased distances and at night. Facial recognition at night is inherently more difficult because similar dense focal arrays are not commercially available in the IR domain. The current efforts began in FY-07 and will continue through FY-12. The program emphasizes incremental development and early field user evaluation.



The Identity Dominance product has several components that when combined will significantly increase the ability of the Warfighter to identify High Value Targets. The product has two main focus areas: increasing the distance at which we can use collected imagery to identify an irregular actor, and better IR exploitation to achieve night time identification.

Signal processing algorithms are also being developed that enhance images collected in the IR band, allowing them to be matched against existing EO image templates. By exploiting all bands in the IR spectrum, clues such as thermal signature, gait, and a person's appearance in three dimensions can be used to increase night time facial recognition accuracy. Additionally, techniques that work across multiple bands and methods are being developed in parallel with a suitable inference classifier to increase the accuracy of identification decision. Signal processing to modify an image will allow what was previously a poor and unusable image to be improved to the point it can be matched to an existing image with confidence.

Identity dominance will enable to Warfighter to identify High Value Targets from a much greater distance than currently possible. Benefits include increased safety to own forces and a more efficient used of resources by quickly dismissing actors determined to be of no interest.

Research Challenges and Opportunities:

- Reasonable entity pattern matching against lower resolution IR focal plane arrays
- Correcting for resolution degradation caused by air turbulence
- Increasing identity accuracy by fusing the output of disparate measurements

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